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CHEMICAL COMPOSITION OF CERTAIN KINDS OF SAUSAGE AND OTHER MEAT FOOD PRODUCTS

By RALPH HOAGLAND, *Senior Biochemist, Biochemic Division, Bureau of Animal Industry*

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INTRODUCTION

Since sausage and other meat food products prepared in whole or in part from chopped meat, meat by-products,[1] and condiments are important articles of food in the American diet, information concerning the nutritive value of these products is to be desired. In a recent paper Hoagland and Snider[2] reported the results of a study of the nutritive value of the protein in a number of kinds of sausage and other meat food products. In this circular are given chemical analyses of a considerable number of samples of the same class of meat food products.

DESCRIPTION OF PRODUCTS ANALYZED

The samples of the several meat food products were obtained from seven Government-inspected establishments located in a number of the more important meat-packing centers. Following is a description of the products examined. Each of these products contained seasoning.

Frankfurter-style sausage of the best quality is prepared from meat, usually a mixture of beef and pork trimmings and certain beef cuts. The ground mixture is stuffed in animal or artificial casings and is then smoked and cooked for a short time. Cheaper grades of Frankfurter-style sausage are made of a mixture of meat and meat by-products. Cereal is frequently added to these grades of sausage.

Bologna-style sausage is prepared from ingredients similar to those used in Frankfurter-style sausage and in a similar manner, except that the former is stuffed in larger casings or other containers and is cooked for a longer time. The cheaper grades of this product are

[1] Meat by-products, as here considered, are any clean, sound, and properly dressed edible parts, other than meat, which have been derived from one or more carcasses of cattle, swine, sheep, or goats, sufficiently mature for food and in good health at the time of slaughter.

[2] HOAGLAND, R., and SNIDER, G. G. NUTRITIVE VALUE OF PROTEINS IN CERTAIN KINDS OF SAUSAGE AND OTHER MEAT FOOD PRODUCTS. Jour. Agr. Research 39: 531-538. 1929.

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made from much the same materials as those used for the same grades of Frankfurter-style sausage. Kosher bologna-style sausage and kosher Frankfurter-style sausage contain no pork.

Pure pork sausage is prepared exclusively from pork, usually lean-pork trimmings, but certain lean-pork cuts are used to a limited extent. The ground mixture is stuffed in animal casings or is packed in other containers. This is an uncooked product.

Fresh link sausage, not pure pork, is made from beef and pork trimmings with or without the admixture of meat by-products. Cereal is frequently added. This sausage must be cooked before being eaten.

Braunschweiger-style sausage is a high-grade smoked and cooked liver sausage prepared from livers and pork trimmings. This product is stuffed in large hog casings.

Liver pudding, or liver sausage, is manufactured chiefly from meat by-products and may contain a moderate proportion of meat. Cereal is frequently added to this product. Liver pudding is thoroughly cooked in the process of manufacture.

Headcheese is usually prepared from a variety of meat by-products from swine and cattle and may contain a moderate proportion of meat. Pig tongues are a frequent constituent of headcheese. This is a cooked product.

Blood sausage is a cooked product prepared from beef blood, and it may contain coarsely chopped fat pork and tongue.

Meat loaf is usually prepared from a mixture of beef and pork. Veal is used occasionally. Sometimes the loaf is prepared from meat, meat by-products, and cereal. The finely ground mixture is molded in pans and thoroughly cooked.

Souse is prepared from a mixture of meat and meat by-products containing a considerable proportion of connective tissue. The product is thoroughly cooked, vinegar is added, and the mixture is molded into pans.

Luncheon roll is a cooked product containing coarsely ground beef and pork. The ground meat is cured for a short time and then stuffed in cloth bags.

Polish-style sausage is prepared from coarsely chopped pork and beef and is characterized by the presence of garlic as seasoning. The ground meat is cured and is then stuffed in hog casings. This is a cooked sausage.

Country-style sausage is a smoked, uncooked product usually prepared from ground pork. This product is usually stuffed in hog casings.

Bockwurst is usually prepared from meat and eggs with or without milk and does not contain cereal or similar substances. The mixture is ground fine and stuffed in sheep or hog casings. This product must be cooked before being eaten.

METHODS OF ANALYSIS

Each sample of sausage or other meat food product was separated from its container, when practicable, and then ground fine. The ground product was packed into glass jars, which were covered tight, and then placed in cold storage at 32° to 36° F. until analyses were completed.

The percentage of water was determined by drying approximately 5 grams of the product in an electrically heated oven at a temperature of 100° C. The percentages of ash, fat, nitrogen, and starch were determined by methods adopted by the Association of Official Agricultural Chemists. The fuel value per pound was calculated on the basis of 4 calories for each gram of protein or starch and 9 calories for each gram of fat.

RESULTS OF ANALYSES

The results of the analysis of the individual samples of meat food products are presented in Tables 1 to 18, inclusive, and in Table 19 is shown the average chemical composition of each kind or grade of meat food product. These analyses were made during 1926 and the early part of 1927. For purposes of comparison, the average composition of beef chuck and of pork chops, respectively, is presented also. As might be expected, a considerable amount of variation is found in the composition of different samples of the same kind of product. These differences are probably due chiefly to the choice of materials and, to some extent, to the method of preparation. Thus, the larger the proportion of fat meat used the greater the fat content and the fuel value of the finished product. On the other hand, the larger the proportion of lean meat the greater the proportion of protein and water. The water content of the finished product is influenced not only by the choice of meats but by the quantity of water added in manufacture and by the method of smoking and cooking the product. The presence of starch in certain products is due to the addition of cereal, usually corn flour, in the process of manufacture.

Attention is called to the fact that the protein in one meat food product may not have the same nutritive value as that in another. For information on this subject the reader is referred to a recent publication by Hoagland and Snider.[3]

TABLE 1.—*Chemical composition of first-grade Frankfurter-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1321	Washington, D. C	63.13	2.25	20.38	2.16	13.50	1,077
1338	do	55.04	2.99	26.14	2.31	14.44	1,329
1348	do	68.63	2.49	13.82	2.34	14.63	830
1360	New York, N. Y	61.04	2.28	24.35	2.00	12.50	1,221
1378	Philadelphia, Pa	49.84	2.98	34.48	1.99	12.44	1,663
1510	Baltimore, Md	58.21	2.67	23.83	2.28	14.25	1,231
1560	New York, N. Y	62.75	2.86	18.87	2.32	14.50	1,033
1573	Milwaukee, Wis	68.37	2.63	14.13	2.09	13.06	814
	Average	60.88	2.64	22.00	2.19	13.69	1,150

[3] HOAGLAND, R., and SNIDER, G. G. Op. cit. (see footnote 2).

TABLE 2.—*Chemical composition of second-grade Frankfurter-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1379	Philadelphia, Pa	57.46	3.25	23.19	2.42	15.13	1,221
1476	Chicago, Ill	61.81	3.52	20.01	2.12	13.25	1,057
1478	do	66.36	2.34	14.33	2.57	16.06	876
1480	do	65.89	3.41	14.32	2.31	14.44	846
1482	do	64.18	2.19	18.87	2.19	13.69	1,019
1484	do	54.44	2.58	28.62	2.09	13.06	1,405
1486	do	58.36	2.88	19.48	2.51	15.69	1,080
1511	Baltimore, Md	62.17	3.39	18.75	2.36	14.75	1,033
	Average	61.33	2.95	19.70	2.32	14.51	1,067

TABLE 3.—*Chemical composition of Frankfurter-style sausage with cereal*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Starch	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1328	Washington, D. C	59.92	3.47	16.60	2.61	16.31	0.90	990
1401	Milwaukee, Wis	65.66	3.32	14.43	2.59	16.19	1.48	910
1574	do	68.47	2.91	10.83	2.19	13.69	1.93	725
1438	Chicago, Ill	68.26	2.02	10.70	2.34	14.63	1.48	729
1491	do	62.21	3.12	15.98	2.68	16.75	.55	966
1493	do	58.97	3.48	18.16	2.39	14.94	.92	1,029
1496	do	64.73	3.33	13.16	2.39	14.94	.92	825
1498	do	66.08	3.34	12.63	2.31	14.44	1.40	803
	Average	64.29	3.12	14.06	2.44	15.24	1.20	872

TABLE 4.—*Chemical composition of first-grade Bologna-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1320	Washington, D. C	64.96	2.18	16.14	2.65	16.56	959
1334	do	59.57	3.43	19.95	2.60	16.25	1,109
1359	New York, N. Y	61.38	2.31	24.19	1.97	12.31	1,211
1387	Philadelphia, Pa	60.19	2.98	22.58	2.17	13.56	1,168
1399	Milwaukee, Wis	66.72	1.66	14.42	2.47	15.44	869
1432	Chicago, Ill	68.50	4.15	15.55	1.99	12.44	860
1513	Baltimore, Md	61.23	2.37	21.52	2.21	13.81	1,129
1566	New York, N. Y	67.61	2.87	13.67	2.35	14.69	824
1575	Milwaukee, Wis	65.69	3.44	15.01	2.26	14.13	869
	Average	63.98	2.82	18.11	2.30	14.35	1,000

TABLE 5.—*Chemical composition of second-grade Bologna-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1388	Philadelphia, Pa	62.20	4.01	18.68	2.26	14.13	1,019
1400	Milwaukee, Wis	69.26	3.31	10.92	2.43	15.50	727
1477	Chicago, Ill	58.75	4.05	20.85	2.38	14.88	1,121
1479	do	69.91	2.34	11.28	2.47	15.44	741
1481	do	65.27	2.91	18.40	2.05	12.81	983
1483	do	63.96	1.86	19.29	2.27	14.19	1,045
1485	do	58.89	3.61	21.99	2.31	14.44	1,160
	Average	64.03	3.16	17.34	2.32	14.48	971

TABLE 6.—*Chemical composition of Bologna-style sausage with cereal*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Starch	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1442	Chicago, Ill	70.80	4.08	8.50	2.13	13.31	4.17	664
1487	do	56.74	2.87	22.12	2.40	15.00	.93	1,192
1492	do	65.87	2.73	15.33	2.22	13.88	.49	886
1494	do	53.94	3.08	23.98	2.45	15.31	1.15	1,277
1495	do	64.29	3.80	11.32	2.52	15.75	2.42	792
1497	do	61.36	3.72	14.95	2.59	16.19	1.26	927
1499	do	64.44	3.70	13.59	2.30	14.38	2.34	858
1501	do	56.22	2.78	22.52	2.47	15.44	1.99	1,235
1514	Baltimore, Md	61.51	3.07	16.90	2.28	14.25	1.50	976
1576	Milwaukee, Wis	68.62	3.24	9.95	2.28	14.25	1.87	699
	Average	62.38	3.31	15.92	2.36	14.78	1.81	951

TABLE 7.—*Chemical composition of pure pork sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1318	Washington, D. C	42.00	1.68	43.67	1.86	11.63	1,994
1339	do	41.02	1.79	45.67	1.82	11.38	2,071
1350	do	45.23	2.23	40.35	1.93	12.06	1,866
1366	New York, N. Y	43.67	2.39	42.86	1.85	11.56	1,959
1381	Philadelphia, Pa	38.78	2.09	50.40	1.60	10.00	2,239
1392	Milwaukee, Wis	37.13	2.21	50.51	1.61	10.06	2,244
1416	Philadelphia, Pa	43.60	1.84	42.43	1.78	11.13	1,934
1417	do	36.25	2.15	52.51	1.43	8.94	2,305
1434	Chicago, Ill	40.64	2.27	46.95	1.56	9.75	2,093
1516	Baltimore, Md	42.57	2.04	42.20	1.68	10.50	1,913
1526	do	51.48	1.78	33.21	2.11	13.19	1,595
1534	do	47.79	2.32	37.79	1.87	11.69	1,755
1564	New York, N. Y	40.83	2.27	46.37	1.65	10.31	2,080
1569	do	35.96	2.17	52.73	1.46	9.13	2,318
	Average	41.93	2.09	44.83	1.73	10.81	2,026

TABLE 8.—*Chemical composition of fresh link sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1380	Philadelphia, Pa	32.52	2.03	56.29	1.37	8.56	2,453
1395	Milwaukee, Wis	38.72	2.56	49.41	1.52	9.50	2,189
1517	Baltimore, Md	53.33	2.33	30.61	2.13	13.31	1,491
1522	do	46.57	2.01	39.30	1.92	12.00	1,822
1533	do	47.73	2.64	38.43	1.81	11.31	1,774
1549	do	46.79	2.67	36.95	2.14	13.38	1,751
1595	Chicago, Ill	50.08	2.65	35.77	1.86	11.63	1,671
1596	do	49.99	3.05	32.50	1.98	12.38	1,551
1597	do	35.23	2.03	53.30	1.48	9.25	2,344
1598	do	46.52	2.81	39.12	1.83	11.44	1,804
	Average	44.75	2.48	41.17	1.80	11.28	1,885

TABLE 9.—*Chemical composition of Braunschweiger-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1324	Washington, D. C.	57.15	3.11	21.75	2.55	15.94	1,177
1337	do	48.21	2.09	36.69	1.96	12.25	1,720
1376	Philadelphia, Pa.	51.98	2.66	28.19	2.29	14.31	1,410
1397	Milwaukee, Wis.	58.20	3.29	17.59	3.01	18.81	1,059
1437	Chicago, Ill.	53.56	2.58	26.49	2.48	15.50	1,362
1518	Baltimore, Md.	61.03	3.43	18.37	2.47	15.44	1,030
1525	do	56.11	1.66	25.59	2.27	14.19	1,302
1546	do	55.31	1.94	24.52	2.61	16.31	1,297
1565	New York, N. Y.	61.33	2.63	18.74	2.45	15.31	1,043
1579	Milwaukee, Wis.	55.37	3.28	23.37	2.52	15.75	1,240
1589	Chicago, Ill.	59.95	2.71	19.90	2.47	15.44	1,092
	Average	56.20	2.67	23.75	2.46	15.39	1,248

TABLE 10.—*Chemical composition of liver sausage (liver pudding)*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1319	Washington, D. C.	58.21	2.69	19.84	2.57	16.05	1,101
1346	do	59.86	1.13	20.43	2.62	16.38	1,131
1349	do	60.64	2.07	19.92	2.79	17.44	1,129
1358	New York, N. Y.	55.49	2.81	25.39	2.60	16.25	1,331
1396	Milwaukee, Wis.	65.85	3.33	10.82	2.93	18.31	774
1521	Baltimore, Md.	55.51	1.14	26.21	2.60	16.25	1,365
1548	do	59.15	1.85	19.81	2.96	18.50	1,144
1587	Chicago, Ill.	61.94	2.48	17.31	2.56	16.00	997
1588	do	54.08	2.58	25.43	2.41	15.06	1,311
	Average	58.97	2.23	20.57	2.67	16.69	1,143

TABLE 11.—*Chemical composition of headcheese*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1325	Washington, D. C.	63.84	2.53	17.94	2.40	15.00	1,004
1362	New York, N. Y.	61.59	2.83	20.18	2.55	15.94	1,113
1384	Philadelphia, Pa.	65.59	1.32	17.95	2.32	14.50	996
1394	Milwaukee, Wis.	55.76	2.84	27.11	2.32	14.50	1,370
1433	Chicago, Ill.	57.79	3.16	25.86	2.13	13.31	1,297
1519	Baltimore, Md.	56.09	1.93	22.22	2.96	18.50	1,243
1542	do	62.97	2.89	14.98	2.90	18.13	940
1558	do	69.41	3.18	11.68	2.30	14.38	738
1567	New York, N. Y.	68.65	1.27	15.67	2.29	14.31	899
1581	Milwaukee, Wis.	65.82	2.02	20.09	2.05	12.81	1,052
1591	Chicago, Ill.	54.92	1.87	29.14	2.25	14.06	1,445
	Average	62.04	2.35	20.26	2.41	15.04	1,100

TABLE 12.—*Chemical composition of blood sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1322	Washington, D. C	58.36	2.73	19.79	2.60	16.25	1,103
1363	New York, N. Y	50.50	2.83	27.87	2.79	17.44	1,454
1367	do	40.98	3.02	43.00	2.07	12.94	1,990
1386	Philadelphia, Pa	51.71	2.26	32.15	2.19	13.69	1,561
1389	do	43.73	2.11	36.72	2.84	17.75	1,821
1398	Milwaukee, Wis	50.08	2.06	31.26	2.71	16.94	1,583
1403	do	51.41	1.75	29.17	2.58	16.13	1,483
1443	Chicago, Ill	34.74	1.16	51.87	1.50	9.38	2,287
1509	Baltimore, Md	47.59	2.73	33.13	2.45	15.31	1,630
1523	do	41.54	2.12	40.75	2.24	14.00	1,917
1537	do	38.59	2.22	45.69	1.76	11.00	2,065
1547	do	47.64	2.30	33.91	2.52	15.75	1,670
1561	New York, N. Y	55.35	2.65	25.07	2.55	15.94	1,313
	Average	47.09	2.30	34.64	2.37	14.81	1,683

TABLE 13.—*Chemical composition of meat loaf*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Starch	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1323	Washington, D. C	64.08	2.64	13.80	3.03	18.94	0.43	915
1361	do	62.61	3.34	18.05	2.54	15.88	(1)	1,025
1385	Philadelphia, Pa	67.45	2.94	13.52	2.44	15.25	(1)	829
1402	Milwaukee, Wis	57.27	4.76	18.36	2.33	14.56	3.68	1,080
1441	Chicago, Ill	64.30	3.09	11.49	2.29	14.31	3.34	789
1508	Baltimore, Md	70.99	3.76	6.63	2.76	17.25	(1)	584
1520	do	64.39	4.62	11.46	2.68	16.75	(1)	772
1539	do	59.32	3.72	13.04	2.63	16.44	4.65	915
1545	do	67.49	3.07	12.17	2.45	15.31	.54	784
1562	New York, N. Y	65.41	3.59	12.34	2.87	17.94	(1)	829
1580	Milwaukee, Wis	60.37	3.00	15.24	2.69	16.81	2.38	970
1590	Chicago, Ill	64.14	3.67	15.35	2.28	14.25	(1)	885
	Average	63.99	3.52	13.45	2.58	16.14	-------	865

[1] Only a trace found.

TABLE 14.—*Chemical composition of souse*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1327	Washington, D. C	74.92	1.58	9.18	2.15	13.44	619
1335	do	70.14	1.46	15.07	2.03	12.69	845
1347	do	66.70	2.82	18.74	2.20	13.75	1,014
1351	do	76.26	2.85	6.74	2.32	14.50	538
1365	New York, N. Y	77.51	1.41	9.75	1.78	11.13	600
1377	Philadelphia, Pa	81.81	1.34	8.58	1.64	10.25	536
1393	Milwaukee, Wis	70.70	1.95	13.39	2.38	14.88	817
1444	Chicago, Ill	70.89	1.66	16.56	1.88	11.75	889
1544	Baltimore, Md	72.56	1.88	11.40	2.29	14.31	725
1557	do	66.51	2.36	15.84	2.34	14.63	912
1563	do	72.16	2.10	11.88	2.08	13.00	721
1570	do	74.31	.97	10.95	2.22	13.88	699
	Average	72.87	1.87	12.34	2.11	13.18	743

TABLE 15.—*Chemical composition of luncheon roll*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1608	Chicago, Ill	54.38	3.29	26.62	2.46	15.38	1,366
1609	do	54.12	5.20	23.93	2.64	16.50	1,276
1610	do	61.72	4.44	13.60	2.98	18.63	893
1611	do	57.27	3.06	24.04	2.36	14.75	1,249
1612	do	59.37	2.88	19.59	2.82	17.63	1,119
1613	do	47.23	2.44	37.35	2.06	12.88	1,758
1625	Milwaukee, Wis	59.66	3.90	19.96	2.82	17.63	1,139
1626	do	47.52	3.28	34.37	2.34	14.63	1,668
1628	do	52.87	3.15	30.01	2.05	12.81	1,457
1630	do	62.07	3.23	16.35	2.74	17.13	983
1632	do	60.72	3.13	17.88	2.87	17.94	1,055
1639	New York, N. Y	60.26	2.62	21.80	2.36	14.75	1,157
	Average	56.43	3.39	23.79	2.54	15.89	1,260

TABLE 16.—*Chemical composition of Polish-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1364	New York, N. Y	59.05	3.62	21.25	2.56	16.00	1,158
1375	Philadelphia, Pa	54.41	3.54	24.76	2.53	15.81	1,297
1404	Milwaukee, Wis	63.93	3.64	16.77	2.54	15.88	973
1515	Baltimore, Md	48.25	3.42	30.38	2.68	16.75	1,544
1524	do	51.79	3.65	27.02	2.68	16.75	1,407
1550	do	55.47	3.14	24.64	2.65	16.56	1,306
1568	New York, N. Y	56.05	3.57	23.63	2.43	15.19	1,240
1592	Chicago, Ill	63.77	3.20	16.00	2.54	15.88	941
1593	do	51.72	3.71	25.11	2.85	17.81	1,348
1594	do	56.00	4.01	21.00	2.80	17.50	1,175
	Average	56.04	3.55	23.06	2.63	16.41	1,239

TABLE 17.—*Chemical composition of country-style sausage*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1614	Chicago, Ill	54.90	3.03	28.58	2.14	13.38	1,409
1615	do	55.96	3.81	21.24	2.60	16.25	1,162
1616	do	46.00	4.96	30.98	2.76	17.25	1,578
1617	do	55.19	5.26	20.11	2.87	17.94	1,146
1624	Milwaukee, Wis	38.77	4.75	39.27	2.73	17.06	1,912
1629	do	51.70	2.83	30.42	2.35	14.69	1,508
1631	do	42.36	4.64	38.48	2.32	14.50	1,834
1638	New York, N. Y	61.76	3.73	14.77	3.14	19.63	959
1640	do	59.04	2.29	23.16	2.43	15.19	1,221
	Average	51.74	3.92	27.45	2.59	16.21	1,414

TABLE 18.—*Chemical composition of bockwurst*

Sample No.	Source	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Fuel value per pound
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
1357	New York, N. Y.	67.23	2.16	20.45	1.66	10.38	1,023
1641	do	70.99	2.14	14.28	1.99	12.44	809
1642	do	61.55	2.35	24.38	1.81	11.31	1,200
1649	Philadelphia, Pa.	73.97	2.69	9.51	2.09	13.06	625
1657	Baltimore, Md.	59.25	2.71	24.92	2.04	12.75	1,249
1658	Chicago, Ill.	56.73	2.53	29.28	1.56	9.75	1,372
1659	do	63.61	2.23	21.59	1.91	11.94	1,098
1660	do	54.89	2.61	30.42	1.91	11.94	1,458
	Average	63.53	2.43	21.85	1.87	11.70	1,104

TABLE 19.—*Average chemical composition of certain kinds of sausage and other meat food products*

Number of samples	Product	Water	Ash	Fat	Nitrogen	Protein (N×6.25)	Starch	Fuel value per pound
8	First-grade Frankfurter-style sausage	*Per cent* 60.88	*Per cent* 2.64	*Per cent* 22.00	*Per cent* 2.19	*Per cent* 13.69	*Per cent* ----	*Calories* 1,150
8	Second-grade Frankfurter-style sausage	61.33	2.95	19.70	2.32	14.51	----	1,067
8	Frankfurter-style sausage with cereal	64.29	3.12	14.06	2.44	15.24	1.20	872
9	First-grade Bologna-style sausage	63.98	2.82	18.11	2.30	14.35	----	1,000
7	Second-grade Bologna-style sausage	64.03	3.16	17.34	2.32	14.48	----	971
10	Bologna-style sausage with cereal	62.38	3.31	15.92	2.36	14.73	1.81	951
14	Pure pork sausage	41.93	2.09	44.83	1.73	10.81	----	2,026
10	Fresh link sausage	44.75	2.48	41.17	1.80	11.23	----	1,885
11	Braunschweiger-style sausage	56.20	2.67	23.75	2.46	15.39	----	1,248
9	Liver sausage (liver pudding)	58.97	2.23	20.57	2.67	16.69	----	1,143
11	Headcheese	62.04	2.35	20.26	2.41	15.04	----	1,100
13	Blood sausage	47.09	2.30	34.64	2.37	14.81	----	1,683
12	Meat loaf	63.99	3.52	13.45	2.58	16.14	----	865
12	Souse	72.87	1.87	12.34	2.11	13.13	----	743
12	Luncheon roll	56.43	3.39	23.79	2.54	15.89	----	1,260
10	Polish-style sausage	56.04	3.55	23.06	2.63	16.41	----	1,239
9	Country-style sausage	51.74	3.92	27.45	2.59	16.21	----	1,414
8	Bockwurst	63.53	2.43	21.85	1.87	11.70	----	1,104
4	Beef chuck (medium fat) [1]	68.30	.90	11.90	----	19.60	----	[2] 841
19	Pork-loin chops (medium fat) [1]	52.00	1.00	30.10	----	16.60	----	[2] 1,304

[1] ATWATER, W. O., and BRYANT, A. P. THE CHEMICAL COMPOSITION OF AMERICAN FOOD MATERIALS. U. S. Dept. Agr., Off. Expt. Stas. Bul. 28, 77 p., illus. 1906.

[2] The fuel values of beef chuck and pork-loin chops have been recalculated on the same basis as that followed with the other products in this table.

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